Open access - the rise and fall of a community-driven model of scientific communication

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Opinion Paper

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Key points

- In 25 years, open access, i.e. free and unrestricted access to scientific information, has become a significant part of scientific communication. However, its success story should not conceal a fundamental change of its nature.
- Open access started, together with the Web, at the grassroots, as a bottom-up, community-driven model of open journals and repositories. Today the key driving forces are no longer community-driven needs and objectives but commercial, institutional and political interests.
- This development serves the needs of the scientific community insofar as more and more content becomes available through open journals and repositories. Yet, the fall of open access as a community-driven model is running the risk of becoming dysfunctional for the scientists and may create new barriers and digital divides.

Introduction

The French historian Marc Bloch observed that history is, in its essentials, the science of change. Open access, as a specific type of scientific communication, looks back on a short history of about 25 years. After a period of pioneering initiatives, open access rapidly gained acceptance and became a significant part of the ecosystem of scientific communication. Open access is conditioned by Internet technology, and its curve of development is intimately related to the success of Tim Berners-Lee's World Wide Web and its philosophy of free publishing and instant worldwide information. Like the Web, open access had its precursors and early adaptors, followed by a kind of "open access boom"and the emergence of commercial services.

In spite of its short history, open access quickly found its annals, chronicles, commentators and historians[(1)(2)(3)(4)]. They sometimes present a simplistic and linear success story, made by some main persons, institutions and organizations, punctuated by some major events and described by some ever-growing dashboard figures. This way of "doing history"is helpful to facilitate the understanding of the "open access movement"and, as a part of it, functions as a consolidating variable. Yet, the success story should not hide the multidimensional reality of open access, its currents and factions, the complexity of the legal, technological and economic aspects, the impact of disciplines, organizations and countries, and its contradictions.

One particular dimension of the open access story is the relationship with the academic community. How and why do scientists and scholars from higher education and research support the open access movement and local or national projects? How does open access

respond to their needs and constraints? The question may appear stupid: isn't open access made for them? The reality is different. Acceptance and uptake are slower than expected, in particular when compared to other Web technologies and tools. Why is this so? Lack of awareness and knowledge? Conservatism, i.e. a kind of academic "neophobia"? Or "academic laziness", avoiding additional work related to the depositing of papers to open repositories? All these arguments have been put forward to explain the relative lack of academic enthusiasm. For some open access protagonists, they justify coercive strategies, like immediate-deposit mandates.

Our argument is different. Sometimes, the result of change differs from the initial goal. Sometimes too, the change is obtained for reasons other than the initial intentions. Our argument is that open access started as a community-driven project but then changed into something different. The turning point of the open access life cycle came in the early years of the 21st century. Our argument is that institutional interests, commercial benefits and neoliberal ideology became key factors of the actual success of open access. These key factors may be useful for the success of open access. And although they may explain only one part of the lack of support by scientists, they do however bear the risk of new barriers to free and direct scientific communication.

The rise

Open access started at the grassroots level. Scientists began to adopt Internet technology for free and rapid dissemination of content in the late 80s. They did this by applying the new technology to the oldest and most functional type of scientific communication, i.e. the academic journal. *New Horizons of Adult Education* was launched in 1987, *Psycoloquy* in 1989, the *Electronic Journal of Communication*, *Postmodern Culture* and the *Bryn Mawr Classical Review* in 1990. Years before the term was coined, these titles invented the gold road to open access. They were academic and scholarly journals in digital format, peer reviewed or refereed, publishing original content, reviews etc. in a particular scientific field, and they were freely available on the Internet, without charge to the reader.

After gold came green. 1990 was a pivotal year for open access. Tim Berners-Lee published his *Proposal for a HyperText Project* called the *WorldWideWeb*, and the High Energy Particle Physics (HEP) community at the Stanford Linear Accelerator Center started to test direct communication of research papers on the Internet, based on the new format TEX[(5)]. However, the email exchange of attachments in TEX was rapidly jamming mailboxes. The junction between the CERN technology and HEP was made in 1991, with the launch of a Web service called arXiv on a Los Alamos server. Paul Ginsparg and his colleagues had invented the green road, i.e. self-archiving of scientific articles, conference papers etc. deposited in some kind of open (institutional, disciplinary…) repository.

The success of both models is well documented by the figures of international directories like OpenDOAR, ROAR and DOAJ. Not all of the pioneering gold titles survived; not all of the early launched repositories are still operational and online. But in the following years, more and more open access journals were released, supported by initiatives like theScholarly Publishing and Academic Resources Coalition (SPARC) and others, and a growing number of institutions and organizations introduced their own open repository. More than 10,000 journals are indexed in DOAJ; OpenDOAR contains the metadata of about 3,000 repositories. The real figures are higher even if it is impossible to provide a reliable number of all repositories, journals, articles or other items that are part of open access.

ArXiv is still there. ArXiv is not only the first and best-known open repository but it is also the best example of the special characteristics of these precursor initiatives: it was not only the right technology at the right time and at the right place, but there was also (and above all) the fact that the HEP community at that time already had a long tradition of sharing resources not on an individual level ("good will") but as a community. The key factor was (and still is) compatibility between technology and the community's information and communication practice. A bottom-up project, as one would say today.

Bottom-up is not a guarantee of success. Several bottom-up journals were launched with much enthusiasm, personal commitment, sometimes even with a kind of self-denial (scientists are not paid for publishing journals but for researching), and then discontinued. Other types of bottom-up open access scientific communication appeared at that early "pioneer times"of the Web, in particular personal websites followed by blogs and other social media. Their development produced a fundamental debate on the quality and functions of scientific communication. Scientists adopt communication vectors insofar as they serve their interests and needs. How can quick and large dissemination, including goals like impact optimization and social responsibility be reconciled with quality control, recording and preservation?

In the late 90s, this debate was joined by another "library-made"problem, the so-called serials crisis, i.e. the widening gap between subscription costs and library budgets. The idea was simple (as so many ideas) and rooted in common law and historical experience: a concerted action by librarians and scientists voluntarily abstaining from subscribing and submitting papers to expensive commercial journals, as a form of protest and financial pressure. This was a grassroots action, equivalent to consumer activism. And it was more than that, since it included the proposal of an alternative non-profit, open communication system. Not only was it a boycott but also a switch, if not a system change.

The 2000 Public Library of Science online petition initiative by Michael Eisen, Patrick O. Brown, Harold E. Varmus and others was a big success. Tens of thousands of scientists and librarians all over the world signed the petition. This was the culminating point of the community-driven model of open access. Shortly afterwards, it became obvious that the model had outlived its usefulness. The grassroots action was ineffective[(6)]. Institutions (and libraries) continued to subscribe to commercial journals, especially to the most expensive while (and because) scientists continued to publish in them.

The fall

Of course, the Janus-faced PLoS petition - success of mobilization but failure of impact - was not the end of open access. It was just the beginning of another story. And paradoxically, this new story appears to provide the key to the current success of open access. The new story took shape between 2000 and 2003, crucial years for open access with new initiatives and projects, decisions, meetings and declarations. Three factors contributed to the fall of open access as a community-driven model. Their origins differ one from the other. Their effects are intertwined and cumulated.

Economic innovation: For some years, publishers considered open access as a direct threat to their business. The turning point came with the PLoS petition which confirmed the unbroken need of scientists for peer-reviewed journals, and their attachment to them, and with new open access journals like *BioMedCentral* and *PLoS One*, shortly followed by the hybrid Springer journals. The academic publishing industry discovered the fact that - and

the ways of how - open access offers new business opportunities. New and even better opportunities than before: the new business models with deals based on article processing charges paid by authors or their institutions (APCs) are no longer limited to (small) library budgets but give access to other (larger) parts of the research budgets. In a paradoxical way, open access appears to contribute to the development of commercial academic publishing. Perhaps in the future, this process will be considered as a modern example of what Schumpeter has called “creative destruction”.

Neoliberalism: Some of the main events of the open access movement were actively initiated and supported by American charities[7]. Their objective has one name: the “open society”, in the tradition of Karl Popper[8]. Their enemies: barriers to free competition, such as socialist regimes in Central Europe and monopolies in capitalistic societies. Probably, they consider the open access movement as a kind of “orange colour revolution”in scientific publishing. In fact, they do not promote the whole range of open access, only the green gratis open access as it seems easy to obtain and faces less legal restrictions, thus being more efficient in destroying monopolies. However, up to now the impact of this charity support seems mitigated. The “big four”commercial publishers are still there, and the main success –green immediate-deposit mandates (Liège model) –has more to do with institutional interests than with the uptake of neoliberalism.

Evaluation and impact: Funding bodies, research organizations and universities have understood the benefits they can get from open access. Free and unrestricted dissemination of scientific information increases the institutional visibility and impact on the Internet counting for international ranking and scientific competition. Also, institutional repositories can be much better tools for academic evaluation and control than library catalogues or bibliographic databases, provided their metadata are more or less exhaustive and linked to current research information systems or functionalities. The institutional need and interest for monitoring and output assessment is a strong driver for green mandatory politics, often supported by academic librarians, less by the scientists themselves.

Economic innovation, neoliberalism and evaluation have in common the fact that they are not rooted in the scientific community, that their main goals are not to satisfy scientists’needs but other interests, and that their outcomes paradoxically can satisfy one part of these needs, in particular through more freely available content. Other factors contribute to the fall of the community-driven model of open access: the economic inefficiency of grassroots gold publishing and the need for consolidation and concentration to make scale economies[9]; the so-called citation-advantage of open access articles which not only serves as an incentive for authors to publish in open access but moreover, improves the impact and quality of gold journals and provides a formidable argument for marketing and sales; the public policy of open data pushing public research organizations “to go open”; and the need for significant investment in powerful and innovative services for the retrieval, selection, preservation and analysis of the overwhelming volume of open content.

Conclusion

Open access to scientific information started at the grassroots, with projects and initiatives to adopt the new Internet and Web technologies to satisfy some of the scientists'interests and needs, such as rapid and direct communication of selected (reviewed) content, large access, preservation and retrieval. 25 years later, the key drivers of the open access movement are no longer the scientists themselves but research managers, publishers, information professionals and politicians. Scientists remain a part of the game. But the game has changed. Quite similar to the World Wide Web, the fall of the community-driven model is probably the price and condition of the success of the open access movement.

Is this good or bad? Should we be for or against this change? Historical dialectics teach us that these are irrelevant questions. Better questions are about conflicting and converging interests, functional and dysfunctional solutions, and financial and political forces. So far, the driving forces of commercial, institutional and political interests have contributed to the success of open access. The problem is that they bear the potential of conflicting interests that may be dysfunctional for the further development of open access, such as:

Control: Academic freedom is a "troublesome concept"[(10)]. It may be hard to define but just as any kind of freedom one knows very well when it is at risk or lost. Academic freedom (which research to do, how to do research, how to disseminate the results and so on) is an old concept, deeply rooted in the history of European universities, and the debate on science and institutional interests or "superior interests of the society"is not really new. To gain support from the scientists, open access should not be opposed to academic freedom.

Embargoes: The main reason for the initial models of open access was immediate dissemination of scientific information. Embargoes protect commercial interests and may serve institutional interests, as they make possible near-to-exhaustive institutional repositories. But as this exhaustiveness is reduced to metadata, embargoes (and on-campus access) are in conflict with the scientists'need for direct communication[(11)]. This conflict may reduce the interest of institutional repositories for scientists.

Article processing charges: Without doubt, APCs contribute to the success of gold open access. They serve commercial interests, they are compliant with institutional interests, and they can satisfy the scientists'needs for immediate and large dissemination of reviewed content[(12)], including the citation advantage mentioned above. The risk of this new business model is that it may create a new digital divide between rich research organizations and the others ("gold for the rich, green for the rest") and that it may even produce a second serials crisis because of a new gap between APC expenditures and cumulated budgets for scientific information.

Dubious quality and information overload: Large open repositories and predatory publishing (a kind of collateral damage of gold open access based on APCs) are at the risk of producing open content of dubious quality, because of different versions, non-selected items, lack of peer review etc. Dubious quality is also a risk of repository metadata. And ever increasing volumes of open content without adequate discovery tools are not helpful for the information needs of the scientific community.

Potential conflicts and dysfunctional developments are not necessarily bad as they may trigger better solutions. Good intentions may not be enough to guarantee the further

success of open access. As a scientist, I am committed to open access as long as it serves my professional interests. In fact, to be honest, my interests are not primarily connected to open access, which is just a vector or means; they are rather connected to scientific communication, i.e. easy access to the kind of information I need for research and teaching and the smooth and large dissemination of my research results. The open access principle[13] can provide a good solution for these interests. My hope, or better still, my expectation, would be that in the future, institutions, commercial publishers, research managers and politicians do not neglect the community's needs at the grassroots level. If they do neglect these needs, we can be almost certain that there will be new and alternative community initiatives and models, with a new cycle of innovation and creative destruction. History is a fascinating show.

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